

A game of skill?: Miscognitions and problematic behaviour in video game players who gamble

Joseph Macey

Gamification Group, University of Tampere, Finland
joseph.macey@uta.fi

Juho Hamari

Gamification Group, Tampere University of Technology, Finland
juho.hamari@tut.fi

Abstract: This study used PLS-SEM to analyse data ($n = 613$) collected via an online survey, in order to investigate potential relationships between gambling related cognitive fallacies, or miscognitions, and both participation in gambling and problematic gambling behaviour in the target population. Statistically significant relationships were found to exist in both cases, an unexpected finding was the negative correlation between Interpretive Bias and both dependent variables. One potential explanation for this may be the sense of personal agency and control engendered through regular video game playing. This study forms one of the first to apply existing measures for gambling related cognitions and apply it to a newly emergent population of video game gamblers, and it marks the start of attempts to understand whether cognitive frameworks which underpin gambling apply to emergent forms in the same way as established forms. This study demonstrates that the Gambling Related Cognitions Scale is an applicable measure in the sample population, while highlighting areas for further investigation. As such, it suggests that the context of video games may affect the way in which gambling is perceived, an issue of significance as the gambling industry attempts to woo younger consumers with more skill-based activities inspired by video games.

Keywords: video games, gambling, PGSI, problematic behaviour, cognitive bias, miscognitions

1. Introduction

Under the growing influence of new media gambling has not only been brought into the realm of web-based electronic commerce, but also into many other areas of online life, such as video games, social media networks, and electronic sports (King, Delfabbro, Kaptsis, & Zwaans, 2014; Lopez-Gonzalez & Griffiths, 2016). The coalescence of video gaming and gambling is just one example of the wider trend of digital convergence (Jenkins, 2006), and has emerged as the popularity of esports has increased worldwide. Esports is popularly conceived of as organised, competitive video gaming (Hamari & Sjöblom, 2017); its rapid growth has been facilitated by the emergence of Internet Protocol Television (IPTV; Scholz, 2011) and online fan communities (Taylor, 2012).

The convergence of gambling and gaming has resulted in the emergence of new forms of gambling, with activities connected to video games and esports available in many forms, both familiar and novel. Esports match betting and fantasy esports are virtually identical to established formats of sports betting (Tsai, 2015). However, esports have also afforded more novel manifestations of gambling practices such as Player-vs-Player (PvP) betting, opening loot crates/cases, virtual item lotteries, and the use of virtual items as wagers for casino and card games (Macey & Hamari, 2018).

Recent legal cases (Holden & Ehrlich, 2017) and a community backlash (Macey, 2017) have highlighted the prevalence of gambling-like experiences in contemporary video games. Previous work has theorised the possibility that such experiences are associated with the development of cognitive biases which then promote more problematic gambling behaviours (Ciccarelli, Griffiths, Nigro, & Cosenza, 2016).

While the prevalence of video game-related gambling (hereafter, VG gambling) has dramatically increased in recent years, there is a distinct lack of academic research in the area, what work there is has focussed on Social Network Casino games (SNC) and free play areas offered by dedicated gambling sites (Gainsbury et al., 2014; Kim, Wohl, Salmon, Gupta, & Derevensky, 2015). Work addressing gambling specifically related to esports has only recently begun to emerge (Gainsbury, Abarbanel, & Blaszczyński, 2017; Macey & Hamari, 2018), until recently research in this area was limited to legal and regulatory issues (Holden, Rodenberg, & Kaburakis, 2016; Owens, 2017).

Due to the fact that VG gambling is facilitated almost exclusively online, concerns exist about the potential for problematic gambling behaviours to develop as a result of such issues as unrestricted access to gambling services and the continuous availability of formerly discontinuous gambling activities. Problematic gambling has also been shown to be associated with the presence of misconceptions concerning the nature of probability and the misinterpretation of cause and effect, an example of one of these misconceptions is the “gambler’s fallacy”.

Whilst VG gambling utilises existing forms, such as sportsbook betting, and contexts, being predominantly accessed via the internet, there are several ways in which it may potentially differ from established practices. In regard to forms of VG gambling, there are several which are not found elsewhere, these include PvP betting and “crash” betting. Furthermore, participation in these and other activities is often facilitated via the use of virtual items which can only be obtained by owning and playing video games, these items can take a number of forms, the most common of which are “skins” (Holden & Erlich, 2017). Using virtual items with no fixed monetary equivalent potentially obscures or confuses established notions of value. Similarly, the game-related context of these emergent forms, such as the use of loot boxes as a game mechanic, can also be thought to obfuscate the true nature of the gambling experience for players. The distinct context of VG gambling can also be seen in the fact that it is popularised and normalised through the dissemination of pre-recorded and live-streamed video content, thereby repositioning gambling as an activity which is consumed passively, in addition to active involvement. As recent scandals have shown, this presentation of gambling is also subject to exploitative and fraudulent activity on the part of the content creators (Holden & Erlich, 2017), something only possible due to the unregulated environment in which VG gambling is currently conducted compared to the highly regulated environments of established forms of gambling.

As such, the role of cognitive biases in the newly-emergent population of video game gamblers urgently requires researching. If cognitions related to established forms of gambling are also found to function in the same way for newly-emergent forms, then established approaches to treatment, for example Cognitive Behavioural Therapy (CBT), may also benefit this new population. On the other hand, if differences exist between cognitive frameworks underpinning established and emergent gambling activities, it is important that we understand how the context of VG gambling may affect the way in which gambling is perceived.

Currently, the younger generations are abandoning established forms of gambling, such as at casinos (Martinelli, 2017), as such, the gambling industry is attempting to woo millennials with

more experience-based events, and through the development of new gambling activities derived from video games and gaming culture (Prince, 2018). Therefore, understanding potential differences in the ways in which traditional gambling and VG gambling are conceptualised by consumers becomes increasingly important.

This study, therefore, will use the Gambling Related Cognitions Scale (GRCS; Raylu & Oei, 2004) to investigate the presence of cognitive biases associated with gambling in a population of regular video game players who also consume esports. Furthermore, this research aims to understand the ways in which cognitive biases interact with the consumption of gambling activities related to video games, and the prevalence of problematic and potentially problematic gambling behaviours by using the Problematic Gambling Severity Index (PGSI; Ferris & Wynne, 2001). These issues give rise to the following questions which guide this research:

RQ1: How do gambling related cognitions relate to the consumption of video game-related gambling activities in a sample of esports spectators?

RQ2: How do gambling related cognitions relate to problematic, and potentially problematic, gambling behaviours in a sample of esports spectators?

1.1. Research Model

An involvement model (Binde, 2013) was developed in order to address the research questions detailed above.

Established research has shown that, in the context of established gambling activities, miscognitions are associated with increased consumption of gambling (Ciccarelli et al., 2016) and with the development of problematic gambling behaviour in established forms of gambling, whether land-based or online. Therefore, the model employed the five subscales of the GRCS as independent variables, with consumption of video game-related gambling and problematic gambling assessment constituting the dependent variables. Age, average household income, and employment status were used as control variables.

Although the particular forms of VG gambling, and the environments which surround it, may differ from established practices, at heart they retain the same elements of calculated risk, uncertain outcome, and an exchange of “wealth” (Griffiths, 2018). Therefore, it is expected that the association between cognitive biases and consumption of gambling will also hold true for the novel gambling activities related to video games (H1) and with increased rates of problematic gambling in the context of video game-related gambling (H2).

Accordingly, all individual constructs of the GRCS are expected to show positive associations with consumption of VG gambling, in varying degrees (H1a). Of the 5 GRCS constructs, Gambling-related Expectations (GE) is expected to demonstrate the strongest individual associations with increased consumption of video game-related gambling activities (H1b) as it is theorised that the anticipation of positive gambling experiences would be associated with increased consumption. Similarly, all individual constructs are expected to show positive associations with PGSI score, in varying degrees (H2a). Finally, Inability to Stop Gambling (IS) is expected to have the strongest individual associations with increased rates of problematic gambling (H2b) as it has been associated with lack of control and, consequently, continued participation (Raylu & Oei, 2004).

The GRCS constructs used as independent variables are all part of a previously validated measure, this study replicates the approach of other research which has validated the GRCS in reference to specific populations and established forms of gambling. As such, this study does not examine the potential interactions or mediators with other variables.

2. Method

2.1 Participants and Procedure

Data was gathered via an online survey, distributed via social media and online discussion forums associated with esports. The final data set (n=613) constitutes 25.6% of total responses received.

Participants were eligible to take part in the survey if they had played video games in the previous 12 months, and had also gambled or watched esports within the same timeframe. All valid responses were given the option of participating in a prize draw to win one of five gift vouchers worth \$50.

The final dataset was skewed heavily both young (27% under 18, 49% 18 to 25) and male (91%). These characteristics are not unexpected, echoing previous research on both esports enthusiasts (Statista, 2017) and online gamblers (Gainsbury, Russell, Wood, Hing, & Blaszczynski, 2015).

2.2 Measurement

The Gambling Related Cognitions Scale (GRCS) is an established and validated tool, the scale consists of a total of 23 items which reflect five distinct sub-scales: Illusion of Control (IC); Interpretive Bias (IB); Gambling-related Expectancies (GE); Inability to Stop Gambling (IS); and, Predictive Control (PC). Responses to each item were collected using a seven-point Likert scale, with options ranging from 1 “strongly disagree” to 7 “strongly agree”. Cronbach’s alpha for the present study was .9, with each of the subscales being: PC ($\alpha = .726$); IB ($\alpha = .525$); IC ($\alpha = .748$); GE ($\alpha = .813$); and, IS ($\alpha = .857$).

The Problem Gambling Severity Index (PGSI) is a widely used means of assessing problematic, and potentially problematic, behaviours related to gambling. The PGSI has been designed to be applicable to any form of gambling, and in any context, as such it is a useful tool to investigate newly-emergent forms of gambling for which specific tools have not yet been developed. The short-form version (nine items) has been shown to be as effective a tool as the longer 27-item version (Ferris & Wynne, 2001). Respondents are assigned to one of four groups based on the scoring of their responses, according to the following system: “never” = 0; “sometimes” = 1; “most of the time” = 2; and, “almost always” = 3. The present study used the original form of all nine items, as detailed in the appendix. Cronbach's alpha for the present study was .822.

Consumption of gambling related to video games was a composite measure, consisting of the following items: frequency, average monthly spend (in US\$), and average weekly hours spent on the activity. Although the link was distributed globally, in total 61 different nationalities were recorded, the survey used US\$ in order to ensure all responses were comparable; in order to assist respondents, the survey contained a link to a respected website which provided accurate currency conversion rates. The VG Gambling construct exceeded thresholds establishing reliability and validity, with Cronbach's alpha, composite reliability, and AVE values of .902, .939, and .836,

respectively. In addition, discriminant validity was also met as the square root of AVE was greater than inter-construct correlations. Collinearity was not an issue as all VIF values were found to be less than 3.

3. Results

Analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM) as it has been shown to be the most appropriate method when assessing models which include latent, formative, or reflective constructs. Furthermore, it is an approach which best suits predictive studies. All results were obtained using SmartPLS 3 for Windows. Table 1 shows the effects between each of the variables in the model (not including control variables):

Table 1: Total Effects of Model

Path	β	p	95% C.I.	
			Lower	Upper
GE -> PGSI score	0.053	0.344	-0.055	0.168
GE -> VG gambling consumption	0.158	0.011*	0.033	0.28
IB -> PGSI score	0.253	< .001***	0.137	0.364
IB -> VG gambling consumption	0.219	< .001***	0.1	0.333
IC -> PGSI score	-0.153	0.007*	-0.241	-0.02
IC -> VG gambling consumption	-0.213	0.001**	-0.314	-0.054
IS -> PGSI score	0.419	< .001***	0.276	0.535
IS -> VG gambling consumption	0.173	0.007*	0.034	0.289
PC -> PGSI score	-0.01	0.883	-0.141	0.131
PC -> VG gambling consumption	0.094	0.192	-0.054	0.229

Legend: GE = Gambling-related Expectations, IB = Interpretive Bias, IC = Illusion of Control, IS = Inability to Stop Gambling, PC = Predictive Control, PGSI = Problem Gambling Severity Index, VG = Video Game-related Gambling

* $p < .05$, ** $p < .005$, *** $p < .001$

The model demonstrates clear support for H1, with four of five GRCS constructs showing statistically significant relationships with VG Gambling Consumption: Gambling Expectations ($\beta = .158$, $p = 0.011$); Interpretive Bias ($\beta = .219$, $p < 0.001$); Illusion of Control ($\beta = -.213$, $p = 0.001$); Inability to Stop Gambling ($\beta = .173$, $p = 0.007$). In total, the model accounted for 21.2% of variance in the consumption of gambling activities connected to video games. Surprisingly, Illusion of Control was found to have a negative correlation with video game-related gambling, thereby rejecting H1a. H1b was also rejected, as the largest correlation for VG Gambling Consumption was with Interpretive Bias rather than Gambling Expectations ($\beta = .219$, and $\beta = .158$, respectively).

Although only three of five GRCS constructs were found to have statistically significant relationships with PGSI Score, the total variance explained was 31.4%, an effect considered large (Cohen, Cohen, West, & Aiken, 2013), as such H2 is supported. As before, Illusion of Control displays a negative correlation with the dependent variable, in this case PGSI, meaning H2a is rejected. However, H2b is supported, with Inability to Stop having the strongest relationship with PGSI ($\beta = 0.419$, $p < 0.001$). Of the controls, only the relationship between age and PGSI score was found to have a statistically significant relationship ($\beta = -.202$, $p = 0.003$).

4. Discussion

This research has found clear evidence that miscognitions related to gambling are associated with both increased consumption of gambling activities and problematic gambling behaviours in a sample of regular video game players and esports enthusiasts who gamble. However, not all the miscognitions were found to behave in the same way, with some exhibiting no discernible relationship while others showed negative associations with both consumption of gambling and with problem gambling score.

That cognitive biases were shown to have clear associations with increased participation in gambling connected to video games and esports, and with problematic gambling behaviours, was in line with expectations and echoes previous research in other contexts (Ciccarelli et al., 2016). It seems likely, therefore, that existing approaches which target the mistaken beliefs, such as Cognitive Behavioural Therapy, would be suitable candidates for addressing problematic gambling behaviours of video game gamblers.

The sub-scale GRCS-GE was expected to correlate most strongly with participation in gambling related to video games, however, GRCS-IB was found to have the strongest, positive association with consumption ($\beta = .225$), rather than GRCS-GE ($\beta = 0.144$). It may be that by re-framing outcomes of gambling, the cognitive biases which constitute Interpretive Bias serve to effect greater influence on future consumption of gambling activities than Gambling-related Expectancies, a group of miscognitions characterised by desire. As such, it may be that the ways in which participants process and rationalise events would prove to be a productive area for further study.

A particularly surprising finding was that one of the subscales (GRCS-IC) had a statistically significant, negative correlation with both increased consumption of video game-related gambling and PGSI score. The Illusion of Control refers to a set of miscognitions in which good fortune is thought to be secured via some kind of ritualistic behaviour or appeal to higher powers. Examples of such behaviour are a belief in prayer, the collection of “lucky” objects and so on. It may be interpreted as suggesting that this particular set of miscognitions actually serves to prevent gambling. However, another perspective is that, as the data set consisted of regular video game players, this particular population possessed more powerful feelings of agency and control. As a result, they rejected the passivity implicit in the beliefs encapsulated in GRCS-IC, further research is required in order to ascertain which of the possible interpretations, if any, are correct. It may even be that GRCS-IC would require re-framing in order to be relevant to this particular population of gamblers.

Indeed, the fact that only three of the five GRCS constructs were found to have statistically significant relationships with PGSI score in this sample is at odds with previous research which has found the constructs to be statistically significant predictors of problematic gambling in established gambling contexts (Oei, Lin, & Raylu, 2007; Yokomitsu, Takahashi, Kanazawa, & Sakano, 2015; Donati, Ancona, Chiesi, & Primi, 2015). Therefore, it seems that further investigation of the GRCS is needed in light of the newly emergent forms of gambling connected to video games.

4.1 Limitations

Data was collected via a publicly available link, and as such the standard criticisms related to self-selected samples apply. However, the specific characteristics of the target population meant that

the process of recruiting a suitable number of participants through established methods of probability sampling, such as calling telephone numbers from a registered directory, would be unfeasible. A further point to consider is that the anonymity of online surveys facilitates potentially sensitive topics, including gambling and addiction, to be addressed while at the same time reducing the potential for responses to be guided by the desire for social acceptance (Griffiths, 2010). Finally, online surveys have been found to produce data as consistent and valuable as that produced by practices such as using university students, or paying participants (Jamnick & Lane, 2017).

5. Conclusion

The results of this work suggest that miscognitions related to gambling function in the same manner for the newly emergent behaviours of esports and video game-related gambling as they do for established forms of gambling. Clear evidence was found of positive correlations between miscognitions and both consumption of gambling, and of problematic gambling. With this in mind, approaches such as Cognitive Behavioural Therapy are likely to be as effective methods for addressing problematic behaviour in video game-related gambling as they are for traditional types of gambling. However, the results also show that the constructs that make up the GRCS are not as universally applicable in respect to emergent gambling activities as for established activities, with only three of five demonstrating statistically significant relationships.

This work has also highlighted several areas which would benefit from further investigation, for example the roles played by specific miscognitions and their effects on problematic behaviour in emergent forms of gambling based on video games. Furthermore, this work identified a potential issue with the GRCS in regard to the population of video game gamblers; further work is required in order to assess whether the subscale Illusion of Control is applicable to this particular group.

The discrepancies between established and emergent gambling activities are likely to become more meaningful as casino operators, and the gambling industry as a whole, seek to attract younger generations by offering new forms of skill-based gambling derived from, and inspired by, video games.

References

- Binde, P. (2013). Why people gamble: A model with five motivational dimensions. *International Gambling Studies*, 13(1), 81-97.
- Ciccarelli, M., Griffiths, M. D., Nigro, G., & Cosenza, M. (2017). Decision making, cognitive distortions and emotional distress: a comparison between pathological gamblers and healthy controls. *Journal of behavior therapy and experimental psychiatry*, 54, 204-210.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. Routledge
- Donati, M. A., Ancona, F., Chiesi, F., & Primi, C. (2015). Psychometric properties of the gambling related cognitions scale (GRCS) in young Italian gamblers. *Addictive behaviors*, 45, 1-7.
- Ferris, J. A., & Wynne, H. J. (2001). *The Canadian problem gambling index*. Ottawa, ON: Canadian Centre on Substance Abuse.

- Gainsbury, S. M., Abarbanel, B., & Blaszczynski, A. (2017). Game on: comparison of demographic profiles, consumption behaviors, and gambling site selection criteria of esports and sports bettors. *Gaming Law Review*, 21(8), 575-587.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D. I., & Blaszczynski, A. (2014). The prevalence and determinants of problem gambling in Australia: Assessing the impact of interactive gambling and new technologies. *Psychology of Addictive Behaviors*, 28(3), 769.
- Gainsbury, S. M., Russell, A., Wood, R., Hing, N., & Blaszczynski, A. (2015). How risky is Internet gambling? A comparison of subgroups of Internet gamblers based on problem gambling status. *New media & society*, 17(6), 861-879.
- Griffiths, M. D. (2010). The use of online methodologies in data collection for gambling and gaming addictions. *International Journal of Mental Health and Addiction*, 8(1), 8-20.
- Griffiths, M. D. (2018). Is the buying of loot boxes in video games a form of gambling or gaming? *Gaming Law Review*.
- Hamari, J., & Sjöblom, M. (2017). What is eSports and why do people watch it? *Internet research*, 27(2), 211-232.
- Holden, J. T., & Ehrlich, S. C. (2017). esports, skins betting, and wire fraud vulnerability. *Gaming Law Review*, 21(8), 566-574.
- Holden, J. T., Rodenberg, R. M., & Kaburakis, A. (2017). Esports corruption: Gambling, doping, and global governance. *Md. J. Int'l L.*, 32, 236.
- Jamnik, M. R., & Lane, D. J. (2017). The Use of Reddit as an Inexpensive Source for High-Quality Data. *Practical Assessment, Research & Evaluation*, 22.
- Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. NYU press.
- Kim, H. S., Wohl, M. J., Salmon, M. M., Gupta, R., & Derevensky, J. (2015). Do social casino gamers migrate to online gambling? An assessment of migration rate and potential predictors. *Journal of Gambling Studies*, 31(4), 1819-1831.
- King, D. L., Delfabbro, P. H., Kaptsis, D., & Zwaans, T. (2014). Adolescent simulated gambling via digital and social media: An emerging problem. *Computers in Human Behavior*, 31, 305-313.
- Lopez-Gonzalez, H., & Griffiths, M. D. (2016). Understanding the convergence of markets in online sports betting. *International Review for the Sociology of Sport*, 1012690216680602.
- Macey, J., Dec 10, 2017, *The Convergence of Gaming and Gambling?* Available: <https://www.tut.fi/Gamification/2017/12/10/the-convergence-of-gaming-and-gambling/>.
- Macey, J. and Hamari, J., 2018. Investigating relationships between video gaming, spectating esports, and gambling. *Computers in Human Behavior*, 80, pp.344-353.
- Martinelli, D. (2017). Skin Gambling: Have We Found the Millennial Goldmine or Imminent Trouble? *Gaming Law Review*, 21(8), 557-565.
- Oei, T. P., Lin, J., & Raylu, N. (2007). Validation of the Chinese version of the gambling related cognitions scale (GRCS-C). *Journal of Gambling Studies*, 23(3), 309-322.
- Owens, M. D. (2016). What's in a name? eSports, betting, and gaming law. *Gaming Law Review and Economics*, 20(7), 567-570.
- Prince, T. Apr 2, 2018. *IGT hopes virtual-reality archery will hit mark at casinos*. Available: <https://www.reviewjournal.com/business/casinos-gaming/igt-hopes-virtual-reality-archery-will-hit-mark-at-casinos/>

- Raylu, N., & Oei, T. P. (2004). The Gambling Related Cognitions Scale (GRCS): Development, confirmatory factor validation and psychometric properties. *Addiction*, 99(6), 757-769.
- Scholz, T. M. (2011). New broadcasting ways in IPTV—The case of the starcraft broadcasting scene. *World Media Economics & Management Conference*.
- Statista. (2017). *Distribution of esports viewers in the united states in 2016, by gender*.
- Taylor, T. L. (2012). *Raising the stakes*. US: Mit Press.
- Tsai, M. R. (2015). Fantasy (e) sports: The future prospect of fantasy sports betting amongst organized multiplayer video game competitions. *UNLV Gaming LJ*, 6, 393.
- Yokomitsu, K., Takahashi, T., Kanazawa, J., & Sakano, Y. (2015). Development and validation of the Japanese version of the Gambling Related Cognitions Scale (GRCS-J). *Asian Journal of Gambling Issues and Public Health*, 5(1), 1.

Appendix:

List of PGSI items:

Some of the next questions may not apply to you, but please try to be as accurate as possible.
THINKING ABOUT THE LAST 12 MONTHS...

1. *Have you bet more than you could really afford to lose?*
2. *Still thinking about the last 12 months, have you needed to gamble with larger amounts of money to get the same feeling of excitement?*
3. *When you gambled, did you go back another day to try to win back the money you lost?*
4. *Have you borrowed money or sold anything to get money to gamble?*
5. *Have you felt that you might have a problem with gambling?*
6. *Has gambling caused you any health problems, including stress or anxiety?*
7. *Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?*
8. *Has your gambling caused any financial problems for you or your household?*
9. *Have you felt guilty about the way you gamble or what happens when you gamble?*